In re Application of: Reich et al
Serial No.: 10/700,588
Filed: November 5, 2003
Office Action Mailing Date: May 15, 2008

Examiner: Timothy J. Dole
Group Art Unit: 2831
Attorney Docket: 26749

1-35 (Cancelled)

36. (Currently Amended) A device for monitoring fluid locomotion in a fluid channel, the device comprising:

(a) a capacitor, being formed on or integrated with the fluid channel and having a variable cross-sectional area; and

(b) electrical contacts, connecting said capacitor to a capacitance measuring device;

said variable cross-sectional area is selected so that a change in a capacitance of said capacitor represents a location of the fluid in the fluid channel wherein the fluid channel is an HPLC column.

37. (Original) The device of claim 36, wherein the fluid is selected from the group consisting of water, a body fluid, a bacterial cell suspension, a protein solution, an antibody solution, a nucleic acid solution and ink.

38. (Original) The device of claim 36, wherein said capacitor is positioned in proximity to an edge of the fluid channel, so as to monitor a rate of drop formation near said edge.

39. (Original) The device of claim 36, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having constant transverse dimensions along said longitudinal axis.

40. (Original) The device of claim 36, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having a variable transverse dimensions along said longitudinal axis.

41. (Original) The device of claim 36, wherein the fluid channel is a capillary.

42. (Original) The device of claim 41, wherein said capacitor comprises two conductive plates engaging opposite faces of said capillary.

43. (Original) The device of claim 41, wherein said capillary has a profile selected from the group consisting of a polygonal profile, a circular profile, an ellipsoidal profile and an irregular pattern profile.

44. (Cancelled)

45. (Currently Amended) The device of claim ~~44~~ 36, wherein said capacitor comprises two conductive plates engaging opposite faces of said HPLC column.

46-48 (Cancelled)

49. (Original) The device of claim 36, wherein a size of said capacitor is in a nanometer scale.

50. (Original) The device of claim 36, wherein a size of said capacitor is in a millimeter scale.

51. (Original) The device of claim 36, wherein a size of said capacitor is in a centimeter scale.

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52. (Original) The device of claim 36, wherein said capacitance measuring device is selected from the group consisting of a capacitance meter and a capacitance bridge.

53. (Original) The device of claim 36, wherein said capacitance measuring device is configured and designed to allow measuring of capacitance at a resolution of less than about 10 % of a total capacitance of said capacitor.

54-133 (Cancelled)

134. (Currently Amended) A method of monitoring fluid locomotion in a fluid channel, the method comprising continuously measuring capacitance changes of a variable cross-sectional area capacitor being formed on or integrated with the fluid channel, the fluid channel being an HPLC column; and

using said capacitance changes to determine a location of the fluid in the fluid channel at any time, thereby to monitor fluid locomotion.

135. (Original) The method of claim 134, wherein the fluid is selected from the group consisting of water, a body fluid, a bacterial cell suspension, a protein solution, an antibody solution, a nucleic acid solution and ink.

136. (Original) The method of claim 134, wherein said capacitor is positioned in proximity to an edge of the fluid channel, so as to monitor of a rate of drop formation near said edge.

137. (Original) The method of claim 134, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having constant transverse dimensions along said longitudinal axis.

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138. (Original) The method of claim 134, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having a variable transverse dimensions along said longitudinal axis.

139. (Original) The method of claim 134, wherein the fluid channel is a capillary.

140. (Original) The method of claim 139, wherein said capacitor comprises two conductive plates engaging opposite faces of said capillary.

141. (Original) The method of claim 139, wherein said capillary has a profile selected from the group consisting of a polygonal profile, a circular profile, an ellipsoidal profile and an irregular pattern profile.

142. (Cancelled)

143. (Currently Amended) The method of claim 134~~142~~, wherein said capacitor comprises two conductive plates engaging opposite faces of said HPLC column.

144-146 (Cancelled)

147. (Original) The method of claim 134, wherein a size of said capacitor is in a nanometer scale.

148. (Original) The method of claim 134, wherein a size of said capacitor is in a millimeter scale.

149. (Original) The method of claim 134, wherein a size of said capacitor is in a centimeter scale.

150. (Original) The method of claim 134, wherein said capacitance measuring device is selected from the group consisting of a capacitance meter and a capacitance bridge.

151. (Original) The method of claim 134, wherein said capacitance measuring device is configured and designed to allow measuring of capacitance at a resolution of less than about 10 % of a total capacitance of said capacitor.

152. (New) A device for monitoring fluid locomotion in a fluid channel, the device comprising:

(a) a capacitor, being formed on or integrated with the fluid channel and having a variable cross-sectional area; and

(b) electrical contacts, connecting said capacitor to a capacitance measuring device;

said variable cross-sectional area is selected so that a change in a capacitance of said capacitor represents a location of the fluid in the fluid channel, wherein the fluid channel is a microchannel of a microfluidic device.

153. (New) The device of claim 152, wherein the fluid is selected from the group consisting of water, a body fluid, a bacterial cell suspension, a protein solution, an antibody solution, a nucleic acid solution and ink.

154. (New) The device of claim 152, wherein said capacitor is positioned in proximity to an edge of the fluid channel, so as to monitor a rate of drop formation near said edge.

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155. (New) The device of claim 152, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having constant transverse dimensions along said longitudinal axis.

156. (New) The device of claim 152, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having a variable transverse dimensions along said longitudinal axis.

157. (New) The device of claim 152, wherein the fluid channel is a capillary.

158. (New) The device of claim 157, wherein said capacitor comprises two conductive plates engaging opposite faces of said capillary.

159. (New) The device of claim 157, wherein said capillary has a profile selected from the group consisting of a polygonal profile, a circular profile, an ellipsoidal profile and an irregular pattern profile.

160. (New) The device of claim 152, wherein said capacitor comprises two conductive plates engaging opposite walls of said microchannel.

161. (New) The device of claim 152, wherein said microfluidic device is selected from the group consisting of a drop ejector, a droplet microswitch, an extracellular electrode, a multi electrode array, a lab-on-chip device and a drug delivery microdevice.

162. (New) The device of claim 152, wherein a size of said capacitor is in a nanometer scale.

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163. (New) The device of claim 152, wherein a size of said capacitor is in a millimeter scale.

164. (New) The device of claim 152, wherein a size of said capacitor is in a centimeter scale.

165. (New) The device of claim 152, wherein said capacitance measuring device is selected from the group consisting of a capacitance meter and a capacitance bridge.

166. (New) The device of claim 152, wherein said capacitance measuring device is configured and designed to allow measuring of capacitance at a resolution of less than about 10 % of a total capacitance of said capacitor.

167. (New) A method of monitoring fluid locomotion in a fluid channel, the method comprising:

continuously measuring capacitance changes of a variable cross-sectional area capacitor being formed on or integrated with the fluid channel, the fluid channel being a microchannel of a microfluidic device, and

using said capacitance changes to determine a location of the fluid in the fluid channel at any time, thereby to monitor fluid locomotion.

168. (New) The method of claim 167, wherein the fluid is selected from the group consisting of water, a body fluid, a bacterial cell suspension, a protein solution, an antibody solution, a nucleic acid solution and ink.

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169. (New) The method of claim 167, wherein said capacitor is positioned in proximity to an edge of the fluid channel, so as to monitor of a rate of drop formation near said edge.

170. (New) The method of claim 167, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having constant transverse dimensions along said longitudinal axis.

171. (New) The method of claim 167, wherein said capacitor comprises two conductive plates defining an inter-plate volume having a longitudinal axis, said conductive plates having a variable transverse dimensions along said longitudinal axis.

172. (New) The method of claim 167, wherein the fluid channel is a capillary.

173. (New) The method of claim 172, wherein said capacitor comprises two conductive plates engaging opposite faces of said capillary.

174. (New) The method of claim 172, wherein said capillary has a profile selected from the group consisting of a polygonal profile, a circular profile, an ellipsoidal profile and an irregular pattern profile.

175. (New) The method of claim 167, wherein said capacitor comprises two conductive plates engaging opposite walls of said microchannel.

176. (New) The method of claim 167, wherein said microfluidic device is selected from the group consisting of a drop ejector, a droplet microswitch, an extracellular electrode, a multi electrode array, a lab-on-chip device and a drug delivery microdevice.

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177. (New) The method of claim 167, wherein a size of said capacitor is in a nanometer scale.

178. (New) The method of claim 167, wherein a size of said capacitor is in a millimeter scale.

179. (New) The method of claim 167, wherein a size of said capacitor is in a centimeter scale.

180. (New) The method of claim 167, wherein said capacitance measuring device is selected from the group consisting of a capacitance meter and a capacitance bridge.

181. (New) The method of claim 167, wherein said capacitance measuring device is configured and designed to allow measuring of capacitance at a resolution of less than about 10 % of a total capacitance of said capacitor.